UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 3575

FORD PARKWAY

OVER THE

MISSISSIPPI RIVER

DISTRICT 9 - RAMSEY COUNTY

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 2255 (CEI 122)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 3575, Piers 7 through 9, were found to be in satisfactory condition with no defects of structural significance observed. There were several areas of spalled concrete, with exposed reinforcing steel that exhibited less than 10% section loss, at or near the waterline on Piers 7 through 9. The caisson supported footings at Piers 8 and 9 were exposed with undermining of the footing observed at Pier 8. Overall, the amount of undermining has diminished since the last inspection due to channel bottom aggredation. Aside from some localized areas of scour around Piers 8 and 9, the channel bottom around the substructure units appeared stable with only the aforementioned aggredation since the last inspection.

INSPECTION FINDINGS:

(A) A band of light to moderate scaling, with exposed aggregate and a maximum penetration of 1 inch, was observed around the entire perimeter of all of the substructure units near the waterline.

(B) Several random areas of moderate spalling with up to 9 inches of penetration and exposed reinforcing steel that exhibited less than 10% section loss were observed at or near the waterline around all of the substructure units.

(C) The footing was exposed at Piers 8 and 9 with a maximum vertical face exposure of 10 feet (full height). Typically, the exposed portions of the footing exhibited heavy scaling with 1 to 2 feet of penetration.

(D) Undermining of the footing was observed at the northwest and northeast corners of Pier 8, with cavities that were 10 feet long by 1.5 feet high with more than 3 feet of horizontal penetration under the footing and 6 feet long by 1 foot high with up to 3 feet of horizontal penetration, respectively.

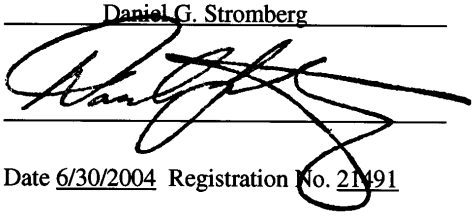
RECOMMENDATIONS:

(A) To promote the long-term service ability of the structure, the spalled areas with exposed reinforcing steel should ideally be repaired by removing all unsound concrete, cleaning and/or replacing the reinforcement, and patching with a concrete mixture designed to promote high durability and low permeability.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

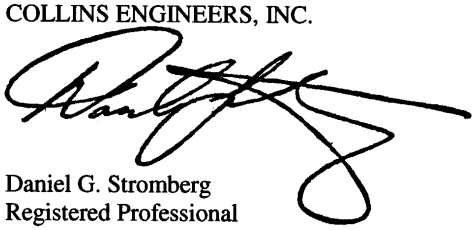
Daniel G. Stromberg



Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 3575

Feature Crossed: The Mississippi River

Feature Carried: Ford Parkway

Location: District 9 - Ramsey County

Bridge Description: The superstructure consists of eleven spans of various configurations. The three main spans over the river each consist of a 300 foot long open spandrel, reinforced concrete arch. The reinforced concrete deck is supported by intermediate concrete pedestals cast into the arches. The arches are supported at the piers, which are supported by footings founded on multiple concrete caissons.

2. INSPECTION DATA

Professional Engineer/Team Leader: Shirley M. Walker, P.E.

Dive Team: Michelle D. Koerbel, Clayton G. Brookins

Date: October 1, 2002

Weather Conditions: Sunny, "70E F

Underwater Visibility: "1 Foot

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 7, 8, and 9.

General Shape: The piers consist of two rectangular reinforced concrete columns which intersect the arches at a common rectangular concrete footing (pier base). Pier 7 is supported by a rectangular spread footing. Piers 8 and 9 are supported by a rectangular footing founded on four large diameter concrete caissons.

Maximum Water Depth at Substructure Inspected: Approximately 31.5 feet.

4. WATERLINE DATUM

Water Level Reference: Bench mark on south end of Pier 9.

Water Surface: The waterline was approximately 4.7 feet below reference.
Waterline Elevation = 725.3.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 6

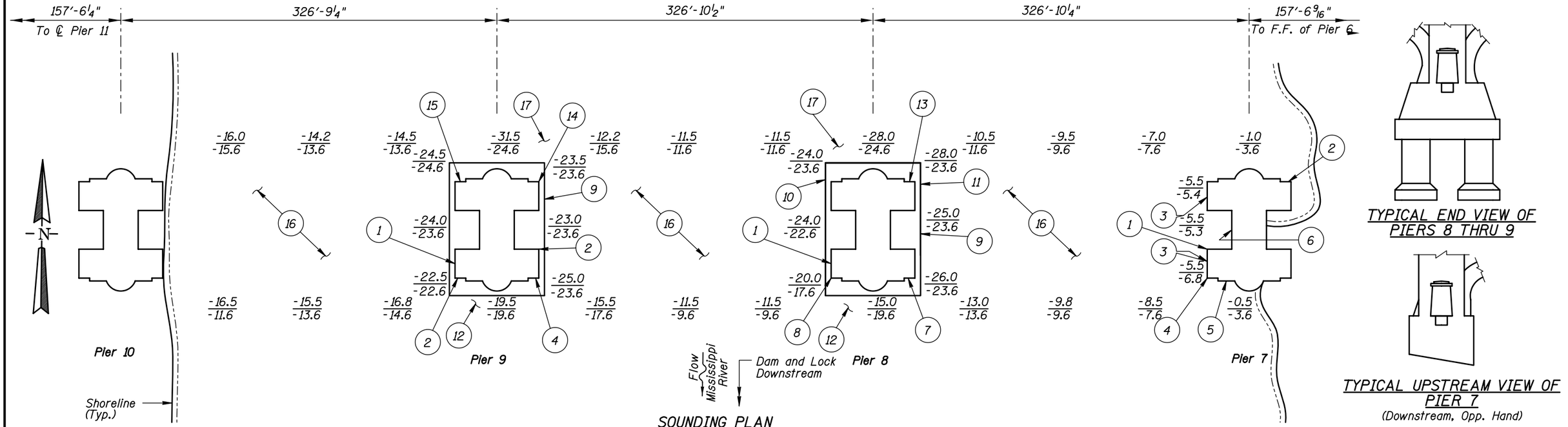
Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/10/02

Item 113: Scour Critical Bridges: Code N/96

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____ Yes __X__ No



SOUNDING PLAN

TYPICAL END VIEW OF PIERS 8 THRU 9

TYPICAL UPSTREAM VIEW OF PIER 7
(Downstream, Opp. Hand)

GENERAL NOTES:

1. Piers 7, 8 and 9 were inspected underwater.
2. At the time of inspection on October 1, 2002, the waterline was located approximately 4.7 feet below the Bench Mark reference of El. 730.0 at the downstream end of Pier 9. This corresponds with a waterline elevation of 725.3 based on the reference.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

(1) Overall, the substructure units were in satisfactory condition with light to moderate scaling around the perimeter of the piers, 1 inch maximum penetration, from 1 foot above to 3 feet below the waterline. There were also random areas of moderate concrete spalling with exposed reinforcing steel that exhibited less than 10% section loss as specifically indicated by other inspection notes.

(2) An area of concrete was spalled, 2 feet by 2 feet with 2 inches of penetration, at 3 feet below the waterline.

(3) Numerous areas of spalled concrete with 3 to 6 inches of penetration were found on the west faces of the columns of Pier 7 from 1 foot below the waterline to the channel bottom. Moderate scaling with a 1 inch maximum penetration was also observed on these faces.

(4) An area of spalled concrete, 2 feet high by 3 feet wide with 6 to 9 inches of penetration and exposed reinforcing steel that exhibited less than 10% section loss, was found on the southwest corner of Pier 7 and the southeast corner of Pier 9 at 4 feet below the waterline.

INSPECTION NOTES: (con't.)

(5) An area of spalled concrete, 3 feet high by 5 feet wide with 3 inches of penetration and exposed reinforcing steel that exhibited less than 10% section loss, was observed at the waterline on the south end of Pier 7.

(6) A vertical crack, 1/16 inch wide, was observed at the center of the west side of Pier 7 from the top of the diaphragm to the waterline.

(7) An area of spalled concrete, 2 feet high by 3 feet wide with 6 inches of penetration and exposed reinforcing steel that exhibited less than 10% section loss, was found at the waterline on the southeast corner of Pier 8.

(8) An area of spalled concrete, 2 feet high by 3 feet wide with 2 inches of penetration, was found at the waterline on the southwest corner of Pier 8.

(9) The footing was exposed around the entire perimeters of Piers 8 and 9. Timber formwork was encountered around the footings of Piers 8 and 9. The exposed portion of the footing exhibited widespread heavy scaling with 1 to 2 feet of penetration

(10) The footing at the northwest and northeast corners of Pier 8 were undermined, with cavities measuring 10 feet long by 1.5 feet high with more than 3 feet of horizontal penetration and 6 feet long by 1 foot high with up to 3 feet of horizontal penetration, respectively.

(11) A void was found in the side of the footing, 2 feet in diameter with 3 feet of penetration, at the northeast corner of Pier 8.

(12) Areas of silty sand deposition were located at the downstream ends of Piers 8 and 9 covering the footings.

(13) An area of spalled concrete, 2 feet high by 8 feet wide with 6 inches of penetration and exposed reinforcing steel that exhibited less than 10% section loss, was found at the northeast corner of Pier 8 at 2 feet below the waterline.

INSPECTION NOTES: (con't.)

(14) An area of spalled concrete, 5 feet high by 2 feet wide with 6 inches of penetration and exposed reinforcing steel that exhibited less than 10% section loss, was found at the waterline at the northeast corner of Pier 9.

(15) An area of spalled concrete, 6 feet high by 6 feet wide with 6 inches of penetration, and exposed reinforcing steel that exhibited less than 10% section loss, was found at the waterline at the northwest corner of Pier 9.

(16) The channel bottom consisted of gravel and sand with scattered concrete rubble and riprap around the substructure units.

(17) Localized scour depressions were observed around the upstream end of Piers 8 and 9 with typical depths of 5 to 10 feet.

Legend

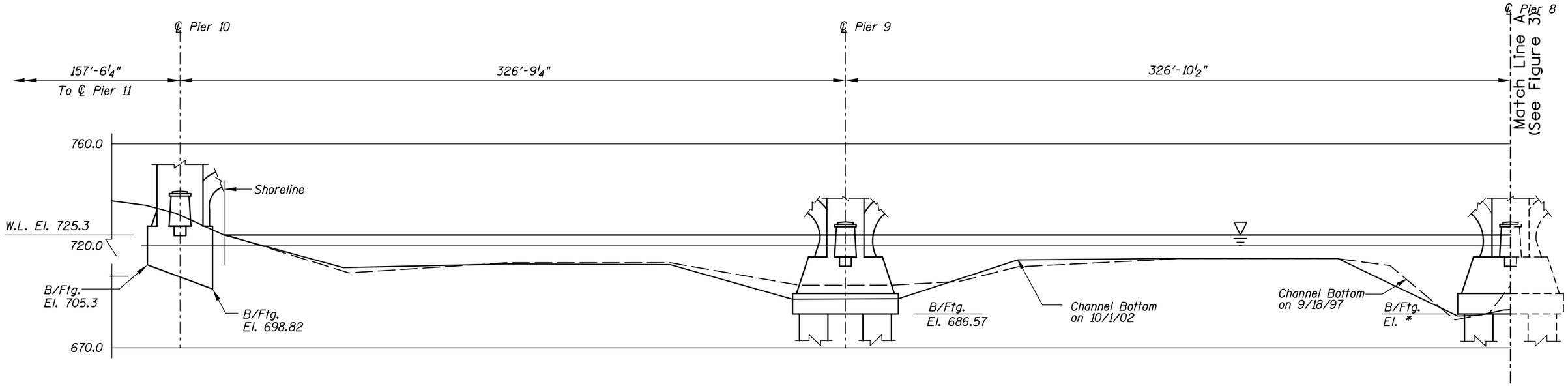
-2.0	Sounding Depth from Waterline (10/1/02)
-5.2	Sounding Depth from Waterline (9/18/97)

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

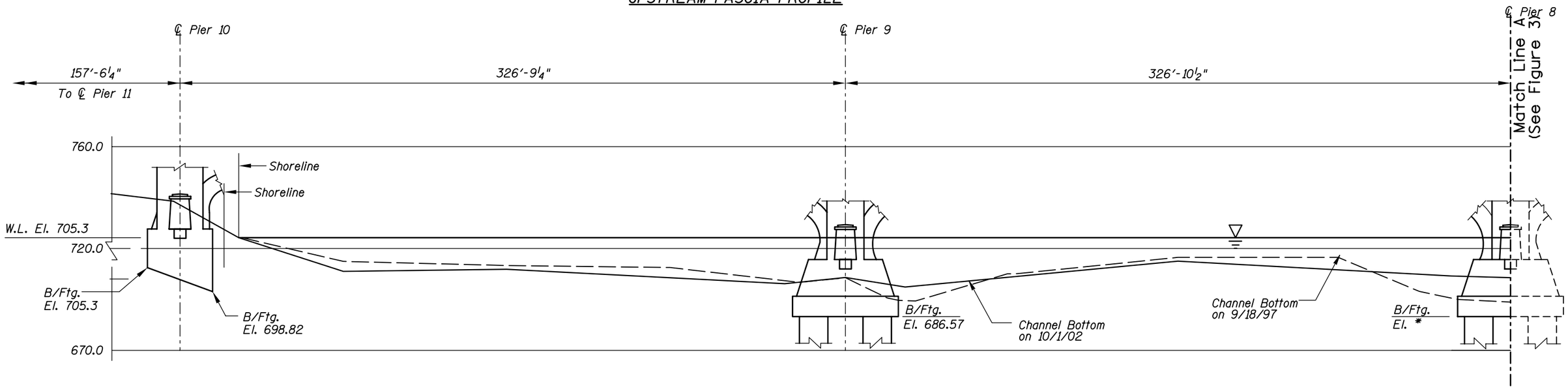
STRUCTURE NO. 3575
OVER THE MISSISSIPPI RIVER
DISTRICT 9, RAMSEY COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: OCT. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35120122		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

* *The bottom of footing elevation noted on the Design Plans does not correspond to the soundings and/or undermining detected at the time of the underwater inspection.*

Note:

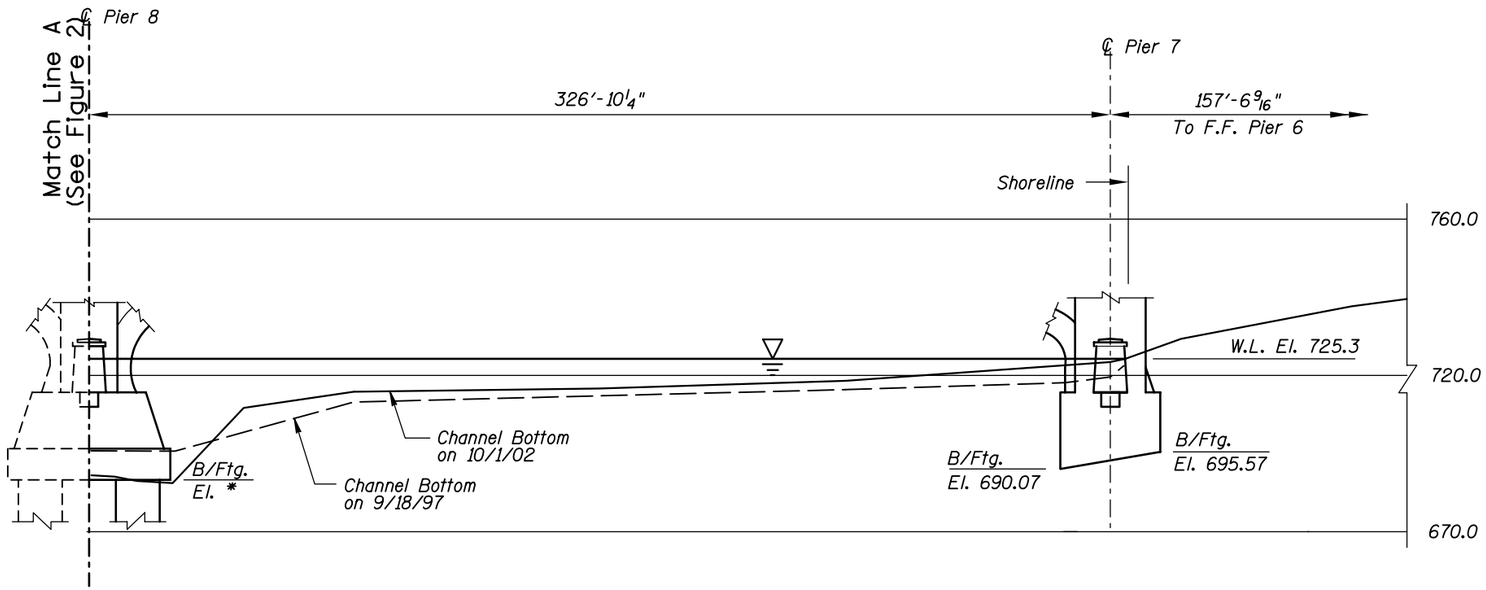
Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

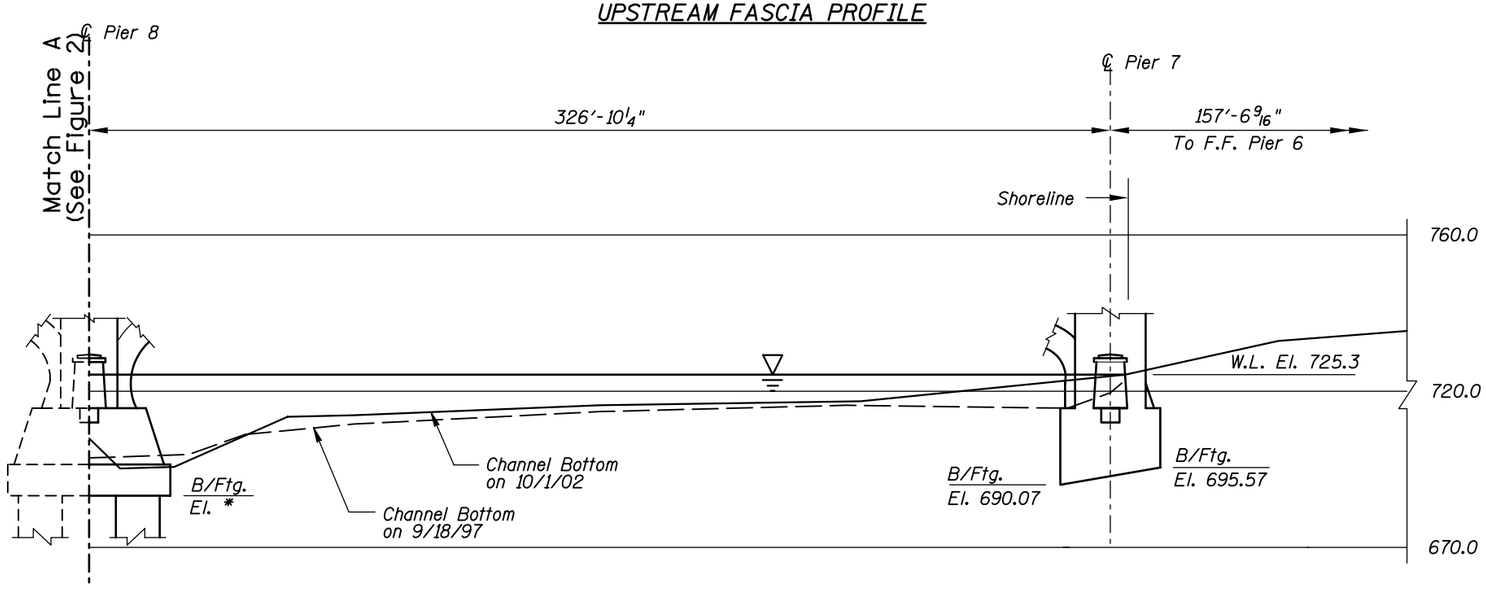
STRUCTURE NO. 3575
OVER THE MISSISSIPPI RIVER
DISTRICT 9, RAMSEY COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: OCT. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: 1"=50'
Code: 35120122		Figure No.: 2



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

* *The bottom of footing elevation noted on the Design Plans does not correspond to the soundings and/or undermining detected at the time of the underwater inspection.*

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 3575
OVER THE MISSISSIPPI RIVER
DISTRICT 9, RAMSEY COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: PRH	**COLLINS ENGINEERS, INC.**	Date: OCT. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: 1"=50'
Code: 35120122		Figure No.: 3

Photograph 1. Overall View of Bridge, Looking South.

Photograph 2. View of Pier 7, Looking East.

Photograph 3. View of Pier 8, Looking Southwest.


Photograph 4. View of Pier 9, Looking Southeast.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: October 1, 2002

ON-SITE TEAM LEADER: Shirley M. Walker, P.E.

BRIDGE NO: 3575 WEATHER: Sunny, "70E F

WATERWAY CROSSED: The Mississippi River

DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR

X OTHER Exercise caution during dive operations due to exposed timber cribbing extending out from substructure at various locations.

PERSONNEL: Michelle D. Koerbel, Clayton G. Brookins

EQUIPMENT: Scuba, Probe Rod, Lead Line, Sounding Pole, U/W Light, Scraper, 14' Boat, Camera

TIME IN WATER: 2:15 p.m.

TIME OUT OF WATER: 4:15 p.m.

WATERWAY DATA: VELOCITY Negligible/None
VISIBILITY "1 foot
DEPTH 31.5 feet maximum at Pier 9

ELEMENTS INSPECTED: Piers 7, 8, and 9

REMARKS: Overall, the substructure units were found to be in satisfactory condition with no defects of structural significance at this time. There were several areas of spalled concrete, with exposed reinforcing steel that exhibited less than 10% section loss, at or near the waterline on Piers 7 through 9. The caisson supported footings at Piers 8 and 9 were exposed with undermining of the footing observed at Pier 8. Besides the localized areas of scour around Piers 8 and 9, the channel bottom around the substructure units appeared stable with no appreciable changes since the previous inspection.

FURTHER ACTION NEEDED: __X__ YES _____ NO

To promote the long-term serviceability of the structure, the spalled areas with exposed reinforcing steel should ideally be repaired by removing all unsound concrete, cleaning and/or replacing the reinforcement, and patching with a concrete mixture designed to promote high durability and low permeability.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 3575
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Shirley M. Walker, P.E.
WATERWAY CROSSED The Mississippi River

INSPECTION DATE October 1, 2002

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 7	5.5’	N	6	N	8	N	6	8	N	N	8	8	6	N	N	6	N	N
	Pier 8	25.0’	N	6	7	8	N	6	7	N	N	7	7	6	N	N	6	N	N
	Pier 9	31.5’	N	6	7	8	N	6	7	N	N	7	7	6	N	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the substructure units were found to be in satisfactory condition with no defects of structural significance at this time. There were several areas of spalled concrete, with exposed reinforcing steel that exhibited less than 10% section loss, at or near the waterline on Piers 7 through 9. The caisson supported footings at Piers 8 and 9 were exposed with undermining of the footing observed at Pier 8. Besides the localized areas of scour around Piers 8 and 9, the channel bottom around the substructure units appeared stable with no appreciable changes since the previous inspection.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.